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Investigating the Variability of Postmaster Costs*

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TABLE OF CONTENTS

I. Introduction

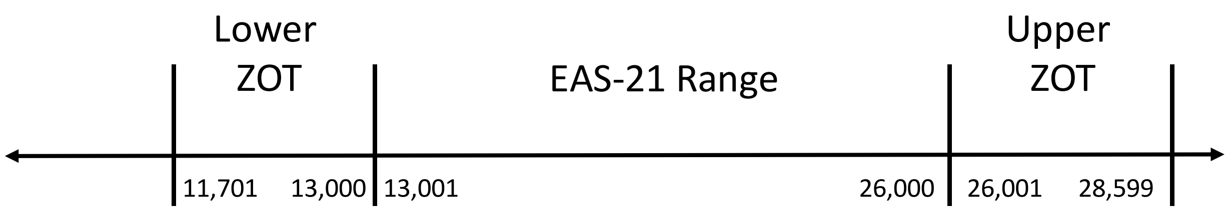
Postmasters are compensated through the Workload Service Credit (WSC) system, in which their pay grade is determined by the number of credits earned. WSCs are earned for the amount of revenue going through the post office, and for performing other non-revenue activities like serving post office boxes and delivery routes, sorting mail, and performing administrative functions.

Postmasters' salaries are set according to a set of pay grades. Each grade is defined by a range of WSCs. For example, grade EAS-21 has a WSC range of 13,001 WSCs to 26,000 WSCs. If an EAS-21 post office's WSCs increased beyond 26,000, it would be a candidate to move up a grade to EAS-22 and its Postmaster would be a candidate to earn a higher salary.

However, such a move is not immediate. First, the office would move into the Zone of Tolerance. The Zone of Tolerance is a procedure put into place by the Postal Service to preclude erratic pay grade variations. If a post office's workload is above the top of what is required for its current grade, it will be placed in the upper Zone of Tolerance, to see if the workload increase is sustained for two years. If so, then the pay grade will be changed and the Postmaster's salary increased. Similarly, if a post office's workload is below the bottom of what is required for its current grade, it will be placed in the lower Zone of Tolerance to see if the workload decrease is sustained for two years. If so, the pay grade will be changed.

For example, grade EAS-21, which has a range of 13,001 WSCs to 26,000 WSCs, has a lower Zone of Tolerance of 11,701 WSCs to 13,000 WSCs, and its upper Zone of Tolerance runs from 26,001 to 28,599 WSCs. This is illustrated in Figure 1. In rare instances, an office's workload increase or decrease could be so large that it skips the Zone of Tolerance and immediately has its pay grade changed.

Figure 1: Range and Zones of Tolerance for EAS-21



Given this structure, the relationship between volume and cost flows through the WSC system. A change in volume at a particular post office leads to a reaction in the office's revenue and in certain office activities that are volume-related, but not revenue-related. This reaction will cause a change in the WSCs for that office. If the change is large enough to move the office out of its current range and into the Zone of Tolerance, it can, if sustained, move the Postmaster to a different pay grade and cause a salary change. Through this mechanism, changes in volume can lead to changes in Postmaster costs.

II. The Current Methodology

The current methodology for attributing Postmaster costs to products has been in place since Docket No. R84-1. It assumes proportionality between volume and WSCs, but relies upon a regression analysis presented in Docket No. R84-1 to measure the variability between WSCs and Postmaster costs. The dependent variable in the regression equation was the minimum salary for each grade from the set of the pay grades that existed in the 1980s, between EAS-A and EAS-23. Costs for Postmasters in pay grades above EAS-23 were assumed to be institutional. The independent variable in the regression was the average WSC value for each pay grade. Each observation was a minimum salary, average wage combination for an EAS pay grade, so this approach relied upon ten data points to estimate the regression.

The regression model has a semi-log form, in an attempt to capture the non-linear relationship between salaries and WSCs. The nonlinearity arises because, in lower EAS grades, it takes a smaller amount of WSCs to move up a grade than it does in higher EAS grades. The model has the following form:

$$\text{Salary} = a + b*\ln(\text{WSCs})$$

In theory, a semi-log model has a variability formula that is given by $\varepsilon = b/Y$, where b is the estimated regression coefficient. In practice, the variability has to be calculated at some point along the regression line. In Docket No. R84-1, this calculation was done at the mean value of the dependent variable. The estimated coefficient from the regression, b, was 2589.8 and the mean salary was 14,207.2, yielding a variability of 18.2 percent. Therefore, the variability of 18.2 percent has been applied since Docket No. R84-1.

However, subsequent to Docket No. R84-1, the Commission considered the proper place to calculate the variability in a standard regression model, and established the practice of performing that calculation at the mean value of the key independent variable, often known as the cost driver.[1] Accordinlgly, the correct formula for calculating the Postmaster variability using the semi-log model is:

$$\varepsilon = \frac{b}{Y(\bar{X})}$$

Based upon the R84-1 regression equation and data, this formula yields the following corrected variability:

$$\varepsilon = \frac{2{,}589.8}{19{,}417.6} = 13.3\%.$$

III. Changes to the Postmaster Compensation System

Given the time that has passed since the Docket No. R84-1 model was estimated, it seems appropriate to investigate if there have been any substantial changes to the Postmaster compensation system that would affect the relationship between WSCs and cost and would affect the method through which the resulting variability should be estimated. Investigation of the compensation system revealed that there are three important changes that should be taken into consideration.

First, in order to preserve rural post offices, the Postal Service modified its post office operating hours to meet actual customer usage. This process, known as the Postal Service's Post Office Structure Plan or POStPlan, identified small offices as 2-, 4-, or 6-hour offices, where the 2, 4 and 6 designation relates to the number of window service hours at the post office. POStPlan not only changed the hours at smaller post

[1] See, Postal Rate Commission, Opinion and Recommended Decision, Docket No. R87-1, at 246-247, Postal Rate Commission, Opinion and Recommended Decision, Docket No. R90-1 at III-16, and Postal Rate Commission, Opinion and Recommended Decision, Docket No. R97-1 at 210.

offices but also changed the Postmaster compensation structure. Following the implementation of POStPlan, post offices that were in the EAS grades below EAS-18 are no longer in the EAS system and are typically staffed by clerks. This change, as a result, eliminated grades EAS-A, EAS-C, EAS-E, EAS-11, EAS-13, and EAS-15.

The second change occurred in Fiscal Year 2019, as the Postal Service split the EAS-18 grade into two grades, a “new” EAS-18 grade, and an EAS-18B grade. The new EAS-18 grade covers the lower half the old EAS-18 WSC range, and the EAS-18B grade covers the upper half of that range. The split was made because the old EAS-18 grade was too large (in terms of the number of Postmasters included) to reflect a consistent level of responsibility within an EAS grade and too large to account for the relative complexity of responsibilities across the grade.

Finally, the Postal Service periodically updates the Postmaster salary scale, revising the amount of salary paid for each grade. The most recent salary schedule was established in January 2019, and because the relative sizes of the salary steps can affect the estimated variability, the most recent salary schedule should be used to estimate that variability.

IV. Updating the Docket No. R84-1 Variability

A first step in estimating a new variability for Postmasters is to update the Docket No. R84-1 variability using more recent data, but the old methodology. This effort supports an investigation of the impact of changes in the Postmaster structure on attributable costs and provides information for evaluating the applicability of the existing methodology to current costs.

As explained above, due to POStPlan, post offices that were in the grades below EAS-18 are no longer evaluated using the WSC system. This eliminates the six bottom EAS grades and leaves just four active EAS grades for consideration under the existing methodology, one each for EAS-18, EAS-20, EAS-21, and EAS-22. In contrast, the number of active grades is augmented by one, due to the split of the old EAS-18 grade, into the new EAS-18 and EAS-18B grades, raising the number of active offices to five. Given that the Docket No. R84-1 variability equation constructed just one observation for each pay grade, these changes imply that updating the variability will rely upon a regression with just five data points.

The FY 2019 Postmaster salary scale was combined with the average April 2019 WSCs for the five remaining EAS grades to re-estimate the semi-log model. That estimation produces an estimated coefficient on WSCs of 5,781.7 and a variability of 8.5 percent.[2] The reduction in variability from the Docket No. R84-1 result occurred because of the structural change in the EAS schedule. An increase in WSCs moves some Postmasters into higher EAS grades and the higher EAS grades provide higher salaries to Postmasters and thus increases total Postmaster cost. The amount by which cost increases in response to increases in WSCs depends, in part, upon how quickly Postmasters will change grades.

When POStPlan eliminated the lower EAS offices, it eliminated the part of the old EAS structure wherein Postmasters could move relatively rapidly from one grade to another and could gain higher minimum salaries. That the lower grades allowed for quicker grade movement for a given increase in WSCs is demonstrated by the fact that

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[2] The complete regression results are presented in Folder 1 (USPS-RM2020-2/1).

the EAS grade bands widen as the EAS grade increases. In the higher EAS grades, much larger increases in WSCs are required to move up a grade and earn a higher minimum salary. Postmasters also earn salary increases above the minimum based on performance. Such increases are determined in performance reviews and are not dependent on the levels of WSCs or volume. The width of the EAS bands at the time the Docket No. R84-1 analysis was prepared, in terms of WSCs, is provided in Table 1. In the lower bands, a WSC increase of 100 would cause or would have a reasonable chance of causing a Postmaster up an EAS grade. In the higher bands, such an increase would be unlikely.

Table 1: Widths of the Old EAS Grade Bands

Grade	**Band Width In WSCs**
EAS-C	41
EAS-E	42
EAS-11	209
EAS-13	484
EAS-15	1,254
EAS-18	3,424
EAS-20	7,499
EAS-21	12,999
EAS-22	42,199

In addition, the salary increments from moving up and EAS grade flatten as the EAS grade increases. The EAS-C salary is nearly double the EAS-A salary and the EAS-E salary is 50 percent larger than the EAS-C salary. In contrast, the EAS-21 and EAS-22 salaries are just over 5 percent greater than the salary in their previous grades.

The impact of these points can be observed graphically by comparing the shape of the salary-WSCs relationship from the Docket No. R84-1 data and the April 2019 data.

Figure 2: Salaries and WSCs Prior to POStPlan

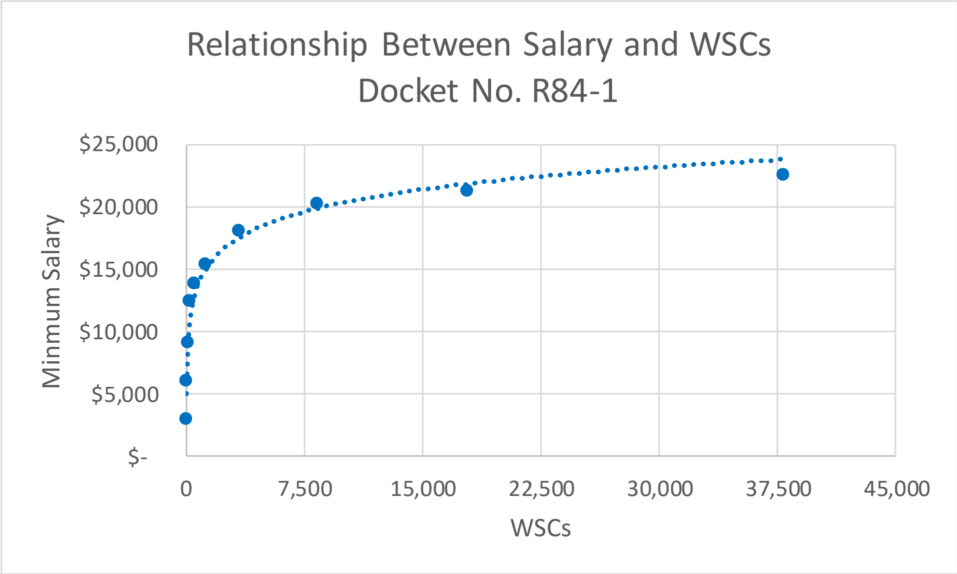
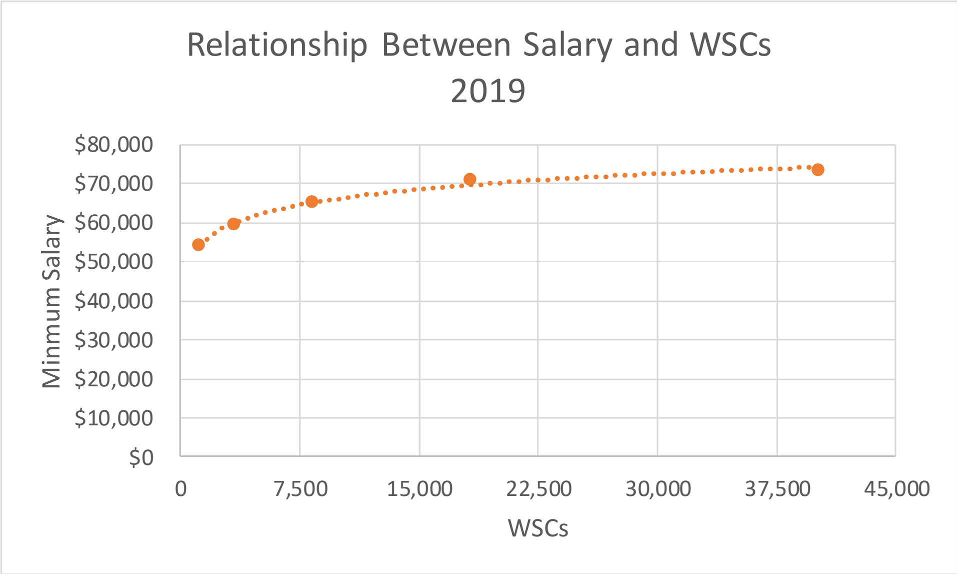


Figure 3: Salaries and WSCs after POStPlan



V. The Availability of Operational Data

One of the reasons that the Docket No. R84-1 model relied upon so few data points was the lack of available data on the WSCs for individual post offices. However, the Postal Service now routinely collects data on Postmaster workload for operational purposes. The operational data are collected through an electronic version of the PS Form 150, which measures and calculates workload for each EAS Post Office and determines the relevant Postmaster grade.

The primary users of these data are area, district, and other field personnel who are interested in validating current workloads and the corresponding pay structure at post offices. Postmasters can also use the Form 150 data for their own post office to review their workloads. When a Postmaster vacancy is posted, the Form 150 process is used to ensure the vacancy is filled at the appropriate pay grade.

The advantage of using this operational data for a variability analysis is that it contains both the EAS grade and current WSCs for the Postmasters in the EAS system, covering over 13,000 offices. Such data will support a more sophisticated variability analysis than was possible in the past. For purposes of estimating a Postmaster variability, the Form 150 data on the EAS grade and the WSCs for the 13,611 post offices in the EAS system were obtained for April 2019. The average WSC value was 10,143.9 WSCs, with a minimum value of 27.5 WSCs and a maximum value of 395,378 WSCs. The inter-quartile range runs from 1,754.1 WSCs to 8,677.8 WSCs. Table 2 presents the distribution of post offices by EAS grade along with each grade's average WSCs and minimum salary.

Table 2: April 2019 Data by EAS Grade

Grade	Number of Post Offices	Average WSCs	Minimum Salary
EAS-18	4,113	1,211.9	$54,081
EAS-18B	4,535	3,410.3	$59,330
EAS-20	2,614	8,325.5	$65,300
EAS-21	1,170	18,233.4	$71,000
EAS-22	858	40,188.3	$73,300
EAS-24	257	97,160.1	$82,000
EAS-26.	64	235,467.1	$99,900

VI. Alternative Approaches to Estimating A Postmaster Variability

With a relatively large operational data set available, alternative approaches to estimating the Postmaster variability may be pursued. Having over 13,000 observations greatly expands the possible models that can be estimated and suggests the estimation may be performed with more confidence than in the past.

A first logical alternative to the Docket No. R84-1 regression is to re-estimate the existing regression equation on the data from all of the post offices in the EAS system from grade EAS-18 through grade EAS-22. Instead of being estimated on just 5 observations, the model can be estimated on data from the 13,290 post offices in those grades. Table 3 presents the results of estimating the semi-log model on the individual post office data, and, at first blush, it looks reasonable. The R^2 is high, the estimated coefficients seem reasonable, and the resulting variability of 8.0 percent is close to the variability of 8.5 percent estimated with the averaged data.[3]

Table 3: Estimating the Semi-Log Model
with All Post Offices

Variable	Coefficient	Statistic
Intercept	18,592.0	143.86
ln(WSCs)	5,123.3	329.67
R^2		0.8911
# of Obs		13,290

However, closer inspection of this approach reveals a fundamental flaw. Namely, OLS estimation assumes that the dependent variable is continuous, but in this instance, the dependent variable is discrete. A continuous variable takes on many different values over the observations in the data set, but a discrete variable takes on just a few different values. Review of the Form 150 data for the dependent variable, minimum salary, shows that it takes on only 5 different values over the 13,290 observations.

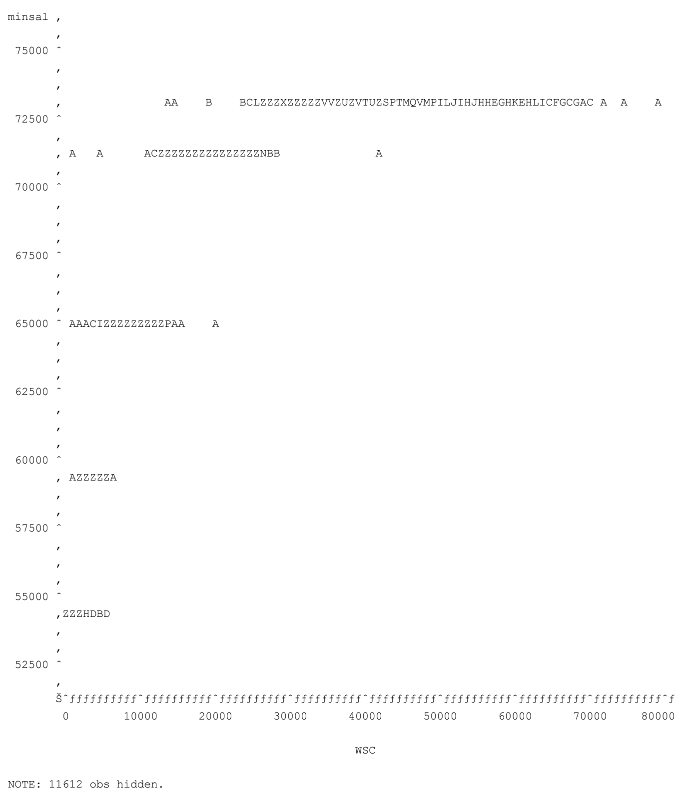
Table 4: Distribution of Values for the
Dependent Variable

Minimum Salary	Frequency	Proportion
$54,081	4,113	31.00%
$59,330	4,535	34.10%
$65,300	2,614	19.70%
$71,000	1,170	8.80%
$73,300	858	6.50%

[3] The complete regression results are presented in Folder 1 (USPS-RM2020-2/1).

Plotting each post office's minimum salary against its WSCs reveals why the OLS regression returns a variability very similar to the five-observation model. Because there are only five different values for the dependent variable, the OLS model is essentially just using five observations to re-estimate the Docket No. R84-1 equation. Consequently, the variation of WSCs within each EAS grade does not come into play. This plot also highlights the step function nature of the EAS grade system.

Figure 4: A Plot of Minimum Salary Against WSCs for EAS Grades 18 through 22



A more appropriate approach, which would truly make use of all 13,000 observations, is to pursue a discrete dependent variable estimation. Discrete dependent variable models are designed to provide appropriate estimation techniques when the dependent variable takes on a limited number of individual values. For example the values for the dependent variable could be the different EAS grades.

For variability estimation, the model should make use of each post office's amount of WSCs to determine its EAS grade. It can thus measure the impact of changes in WSCs on EAS grades and that grade change can be translated into the resulting change in costs. A discrete dependent variable model will accomplish this because the model is designed to predict the probability that a given observation will achieve one of the discrete values for the dependent variable. In the case of Postmasters, a discrete dependent variable model predicts the EAS grade for any post office, given its WSCs, and can thus measure how quickly Postmasters move up a grade as WSCs increase.

A straightforward discrete dependent variable model that is consistent with the linear OLS model estimated above is the linear probability model. In the linear probability model (LPM), the response probability is a function of the explanatory variables:

$$Pr(Y = 1 | X = x) = \alpha + \beta x$$

In the case of Postmasters, a linear probability model would be estimated for each of the EAS grade pairs. That is, there would be one equation estimated for the step from EAS-18 to EAS-18B, another for the step between EAS-18B and EAS-20, and so on. In each equation, the dependent variable takes a value of zero for the lower EAS grade, say, EAS-20, and a value of one for the next higher EAS grade, say, EAS-21. The specification for the step between EAS-20 and EAS-21 yields the following probability.

$$Pr(EAS = 21 | WSC = x) = \alpha + \beta x.$$

The impact of a change in WSCs on the probability of moving up a grade is given by the estimated regression parameter:

$$\Delta Pr(EAS = 21 \middle| WSC = x) \; = \; \beta \Delta x.$$

While the linear probability model is straightforward and the results are easy to interpret, it has the severe drawback that its probabilities are not bounded by zero and one. In other words, it is possible for the model to produce negative probabilities, which are nonsensical, and probabilities greater than one, which are impossible in reality.

The degree to which either of these two problems arises in estimating the Postmaster variability can be determined by estimating the linear probability model. For example, consider the estimated linear probability model for the offices in grades EAS 20 and EAS 21. That model was estimated on 3,784 observations, had an R^2 of 0.729 and produced an estimated WSCs coefficient of 0.00007354 with a t-statistic of 100.8.[4] The estimated coefficient implies that an increase of 500 WSCs raises the probability of moving up an EAS grade by 3.67 percentage points.

But a review of the probabilities produced by the linear probability model reveals that the unbounded nature of the model is a real problem for estimating a Postmaster variability. A probability of zero means the office is an EAS-20 grade with certainty and a probability of one means it is an EAS-21 office. In between the two values, the probability reflects the model's prediction of which grade the office should be in. As Table 5 shows, only about half of the probabilities fall in the acceptable range, with 27.5 percent

[4] The complete regression results are presented in Folder 1 (USPS-RM2020-2/1).

of them being negative. These results demonstrate that the linear probability model is not appropriate for estimating a Postmaster variability.

Table 5: Distribution of Probabilities from the Linear Probability Model

Condition	Number	Proportion
Probabilities Less than Zero	1,042	27.5%
Probabilities Between Zero and One	2,434	64.3%
Probabilities Greater than One	308	8.1%
Total	3,784	100.0%

One approach developed to deal with these drawbacks in the linear probability model is the log probability model. The log probability model is similar in nature to the linear probability model except that the explanatory model enters as a natural log:

$$Pr(EAS = 18B \,|\, WSC = x) \;=\; \alpha + \beta \ln(x).$$

Because of its nonlinearity, this specification moderates the tendency of the linear probability model to produce probabilities greater than one. The log model has the characteristic that as WSCs increase, the increase in probability associated with a given increase in WSCs decreases.

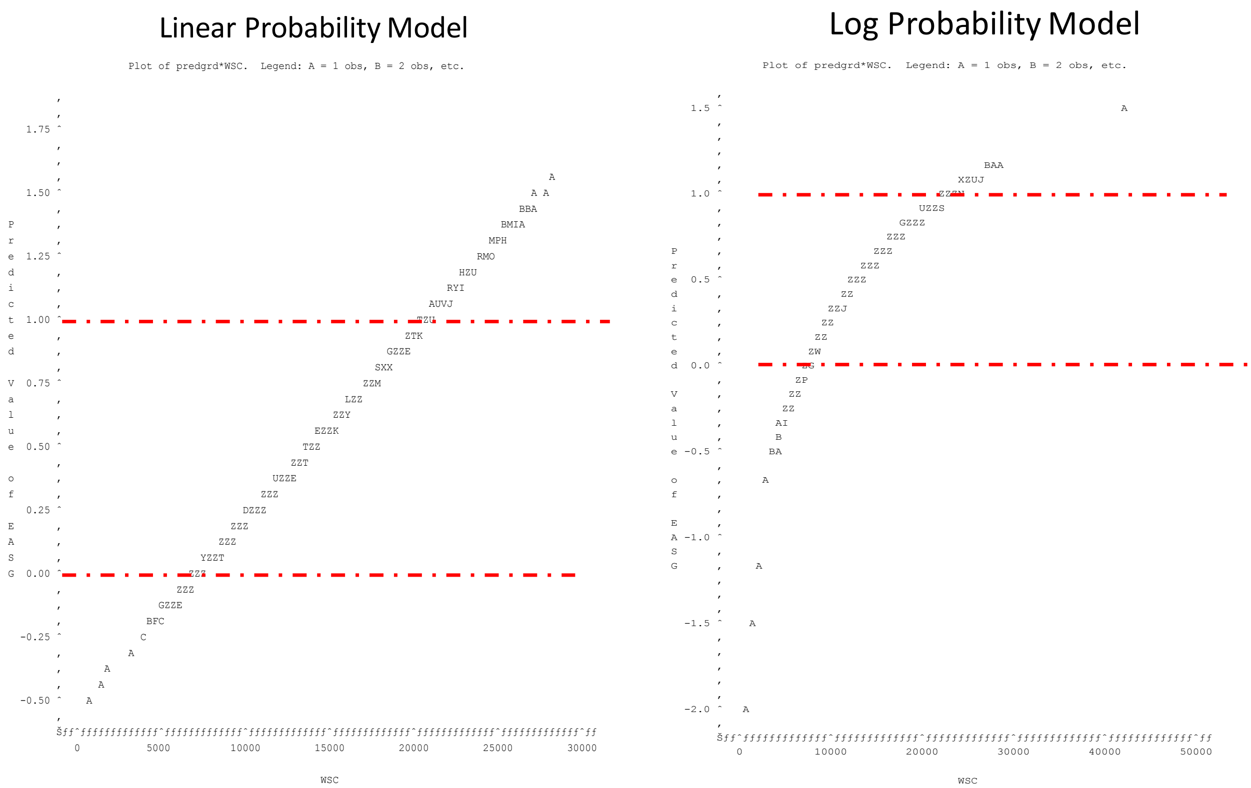
Table 6 indicates that the log model does indeed moderate the probabilities greater than one, reducing them from 21.2 percent of the probabilities to just 4.1 percent. However, problems still remain as the proportion of negative probabilities remains about the same and only 68.8 percent of the observations fall in the feasible range.

Table 6: Distribution of Probabilities from the Log Probability Model

Condition	Number	Proportion
Probabilities Less than Zero	1,026	27.1%
Probabilities Between Zero and One	2,602	68.8%
Probabilities Greater than One	156	4.1%
Total	3,784	100.0%

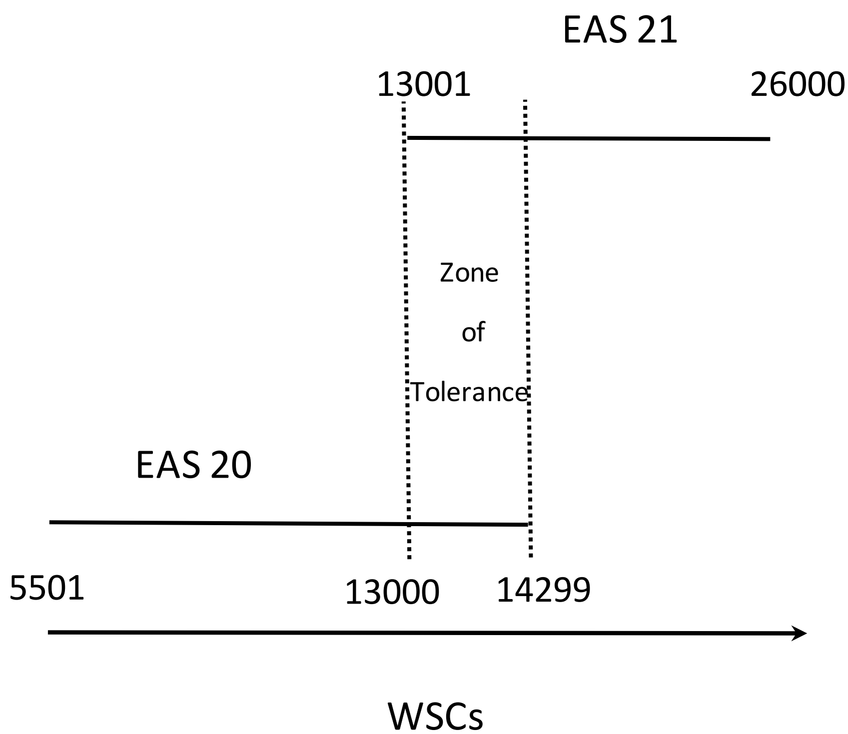
In addition, the log probability model, like the linear probability model, does not produce results that replicate the actual distribution of EAS grades across the various values for WSCs. Most post offices fall well within the range of values for the EAS grade with only a few having WSC values in the Zone of Tolerance range. To accurately capture the nature of the EAS system, all post office probabilities should be between zero and one and the predicted values should be sigmoidal in shape, reflecting massing the probabilities in each EAS level. Neither the linear probability model nor the log probability model has these characteristics.

Figure 5: Predicted Probabilites from the Linear and Log Probability Models



For example, consider post offices potentially moving from EAS-20 to EAS-21. For a large range of WSC values, an office would be well within the values for the EAS 20 grade. But as WSCs increase, a post office would enter the “Zone of Tolerance” range, in which offices switch from one grade to the other. In that range, an office may be either an EAS-20 grade or an EAS-21 grade, with the same or overlapping WSC values. Eventually, there is a range of WSC values that ensure that all offices are in the EAS-21 grade. This pattern is illustrated in Figure 6. Ideally, the variability model would be able to capture this pattern of transition.

Figure 6: Illustration of the Distribution of Post Office Across EAS Grades

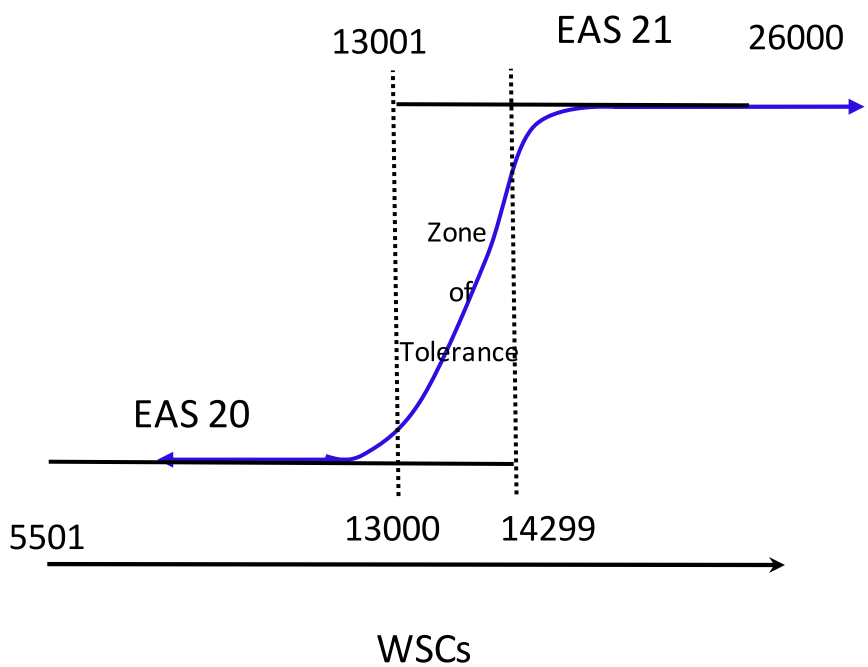


A logistic (or logistical or “logit”) model has the desired characteristics. The response probability in a logistic model is a function of the explanatory variables in a specific nonlinear way:

$$Pr(Y = 1 \mid X = x) = \frac{e^{\alpha + \beta x}}{1 + e^{\alpha + \beta x}}$$

The nonlinear form ensures that the probability never falls below zero or increases above 1. As x increases, $e^{\alpha + \beta x}$ gets extremely large and the ratio approaches 1. As x decreases, $e^{\alpha + \beta x}$ goes to zero. Depending upon the value for the estimated switching parameter, the “switching range” for x can be quite narrow. The logistic model thus has the possibility of mirroring the actual movements in EAS grades as WSCs increase. That is, a logistic model has the same shape as the actual movement of WSCs and EAS grades, and thus should be effective at measuring how quickly EAS grades change when WSCs increase. In the following figure, a logistic model is combined with the pattern of transition in the EAS system.

Figure 7: Combining a Logistic Model with the Distribution of Post Offices



One challenge associated with estimating logistic models is their interpretation. The logistic model is sometimes called the “log odds” model because it can be written in the form of the log of the odds ratio for a probability of a “success” (here a “success” is defined by an office achieving a higher EAS grade). An example of the odds ratio is given by the ratio between a probability of an office achieving an EAS-21 grade and the probability of an office staying as an EAS-20 grade. The logistic model uses the explanatory variable (here WSCs) to explain and predict the odds ratio.

Unfortunately, it does not provide a very easy interpretation of the impact of WSCs on EAS grades and ultimately costs. For example, if an office has a 30 percent probability of moving to an EAS 21 grade, then the odds ratio is (0.30/0.70) or 0.4286. If the probability of moving to an EAS-21 grade is 0.50, then the odds ratio is 1. Finally, if the probability of moving to an EAS-21 grade is 0.80, then the odds ratio is 4. But to say, for example, that an increase in WSCs pushes an office's odds ratio from 0.4286 to 1 or to 4 may not provide much insight.

An alternative, and more useful, approach is to extract the probability of moving up an EAS grade. To do so, one starts with the logistic model:

$$ln\left(\frac{\pi_i}{1-\pi_i}\right) = \alpha + \beta\, WSC_i$$

Then, one takes anti-logs of both sides:

$$e^{ln\left(\frac{\pi_i}{1-\pi_i}\right)} = e^{\alpha+\beta\, WSC_i}$$

Cancels terms:

$$\frac{\pi_i}{1-\pi_i} = e^{\alpha+\beta\, WSC_i}$$

Collects terms in the exponential:

$$\pi_i = (1-\pi_i)e^{\alpha+\beta\, WSC_i}$$

Isolates the probability:

$$\pi_i\left(1+e^{\alpha+\beta\, WSC_i}\right) = e^{\alpha+\beta\, WSC_i}$$

And, solves for it:

$$\pi_i = \frac{e^{\alpha+\beta\, WSC_i}}{(1+e^{\alpha+\beta\, WSC_i})}.$$

This exercise produces an expression that allows computation of the impact of a change in an office's WSCs on the probability of it changing its EAS grade. This is an essential part of estimating the variability of Postmaster costs. This expression also shows that the estimated beta coefficient can be considered a measure of the speed of transition between two EAS grades. The larger the value for the estimated beta, the faster is the transition (in terms of the amount of additional WSCs needed to move up a grade) between EAS grades. A faster transition is associated with a higher variability.

VII. Estimating Logit Models

Before estimation of a logit model or models begins, a determination must be made about which type of logit model is applicable. The EAS system includes a set of pay grade steps which determine each Postmaster's compensation. The key modeling question for choosing a logit model is whether the pay steps should be considered individually or as a single group. If the former is the correct characterization, then separate parameters should be estimated for each step, whereas if the latter is correct, a single estimated beta should be estimated for all steps.

Recall that the beta coefficient measures the speed at which a Postmaster moves from one step to another as WSCs increases. To the extent those speeds differ at different points in the EAS system, then it is appropriate to estimate individual logit models for each step. Evidence on this issue can be produced by reviewing the WSC structure in the EAS system. If the WSC bands (the ranges of WSCs for the various grades) are about the same for all EAS grades, then a given increase in WSCs has the same ability to move a Postmaster up a grade regardless of which grade she or he is currently positioned. On the other hand, if there are material differences in the size of the bands, then a given change in WSCs will have a differential impact on the likelihood of moving up a grade at different EAS levels.

Table 7 presents the WSC bands for the various EAS grades, along with the midpoint values. It shows that the band sizes vary substantially, with the band size growing as the EAS grade increases. In other words, it takes a much larger increase in WSCs to move up a grade for an EAS-22 or EAS-24 Postmasters than it does for EAS-18 or EAS-18B Postmaster. This suggests that there are different speeds of transition, with the transition speed falling as the EAS grade increases and that estimating separate logit models for each grade step is appropriate.

Table 7: WSC Requirements in the EAS System

Grade	**Lower**	**Midpoint**	**Upper**	**Range**
18	0	1,038	2,075	2,075
18B	2,076	3,788	5,500	3,424
20	5,501	9,251	13,000	7,499
21	13,001	19,501	26,000	12,999
22	26,001	47,101	68,200	42,199
24	68,201	117,701	167,200	98,999
26	167,201			

In the current EAS system, there are seven grades, leading to six different steps. As a result, six individual logit models should be estimated to capture the impact of changes in WSCs on the distribution of Postmasters across grades. Table 8 presents the set of steps for which models should be estimated.

Table 8: Grade Steps in the Current EAS System

EAS-18	→	EAS-18B
EAS-18B	→	EAS-20
EAS-20	→	EAS-21
EAS-21	→	EAS-22
EAS-22	→	EAS-24
EAS-24	→	EAS-26

A. Estimating the Core EAS Models

The four steps from EAS-18B through EAS-24 cover the core of what would have been covered by the old methodology, so the results for those four steps are first presented and discussed. The step from EAS-24 to EAS-26 was excluded from the Docket No. R84-1 analysis by assumption, but with the operational data, a logit model can be estimated for that step and it will be presented next. Finally, the creation of a new EAS grade, EAS-18B, creates some additional estimation issues, so the logit model for EAS-18 to EAS-18B step will also be presented and discussed separately.

Table 9 present the estimated logit models for the four central steps in the EAS system.[5] First, note that EAS-18B represents the upper half of the previous EAS-18 grade. Postmasters move from EAS-18B to EAS-20, as WSCs increase. The Zone of Tolerance from the old EAS-18 to EAS-20 appears to still apply to EAS-18B and EAS-20. The Chi-Square tests presented in the table indicate that all of the estimated coefficients are statistically significant. In addition, the estimated WSC coefficients

[5] The full results for these logit models are presented in Folder 1 (USPS-RM2020-2/1).

decrease as the EAS grade increases. Recall that these estimated coefficients are the impact on the log odds ratio from an increase in WSCs. The higher the odds ratio, the greater the probability of moving up to the EAS grade. A larger estimated coefficient on WSCs means that a given increase in WSCs will have a bigger impact on the odds ratio and thus the likelihood of moving up a grade. Thus, the coefficients are a measure the speed of transitions between grades.

Table 9: Logit Estimation Results

Model	**Parameter**	**Estimate**	**Std. Error**	**Wald Chi-Square**
18B to 20	Intercept	-30.66	1.47	433.59
	WSCs	0.005660	0.000272	432.3088
20 to 21	Intercept	-30.41	1.97	237.32
	WSCs	0.002320	0.000152	233.4148
21 to 22	Intercept	-27.11	2.10	166.15
	WSCs	0.001040	0.000082	164.2763
22 to 24	Intercept	-24.65	2.87	73.60
	WSCs	0.000359	0.000042	73.50

In terms of model evaluation, the traditional measures of model fit like R^2 do not apply to logit models, so alternative measures have been derived. One such alternative is the Cox-Snell generalized R^2 statistic. The Cox-Snell does not have the standard R^2 interpretation of being the proportion of the variance of the dependent variable (about its mean) explained by the regression model. Rather, the Cox-Snell makes use of the fact that the logit model is estimated using maximum likelihood. This can be seen through a review of the Cox-Snell formula:

$$R^2 = 1 - \left(\frac{L_M}{L_O}\right)^{2/n}$$

In this equation, L_M is the likelihood for the estimated logit model and L_O is the likelihood for a naïve logit model with no explanatory variables. This formula shows that Cox-Snell embodies the increase in likelihood caused by including the explanatory variables in the model and thus provides a measure of model fit. One drawback of this measure is that its upper bound is less than one, and can be well below one. To correct this, one calculates the adjusted Cox-Snell generalized R^2 statistic by dividing the above-calculated statistic by its upper bound. Table 10 presents the adjusted Cox-Snell R^2 statistics and they all indicate the models fit the data well.

Table 10: Cox-Snell Adjusted R^2 Statistics

Model	**R^2**
18B to 20	0.9537
20 to 21	0.9471
21 to 22	0.9409
22 to 24	0.9305

Another widely used measure of model fit is the Hosmer–Lemeshow (H-L) statistic. Unlike the Deviance and Pearson goodness of fit measures, which are inappropriate and inaccurate when the explanatory variable is continuous (as it is here), the H-L is applicable to the Postmaster logit equations. The H-L statistic ranks all the observations by their probability of being in a certain grade, forms them into groups and then compares the actual number with the expected number, by group:

$$L = \sum_{q=1}^{10} \frac{\left(O_{rq} - E_{rq}\right)^2}{E_{rq}} + \sum_{q=1}^{10} \frac{\left(O_{nrq} - E_{nrq}\right)^2}{E_{nrq}}$$

In this equation, "O" stands for an observed value and "E" stands for an expected value. The H-L statistic is used to test the null hypothesis that the logit model has a good fit. Table 11 provides the H-L statistics for the estimated logit models. In all cases, the H-L test indicates rejection of the hypothesis of a good fitting model.

Table 11: Hosmer–Lemeshow Statistics

Model	**H-L Statistic**	**Reject H_o?**
18B to 20	2480.26	Yes
20 to 21	5919.25	Yes
21 to 22	5140.41	Yes
22 to 24	1478.96	Yes

An investigation into the source of these rejections demonstrated that the fit problem arises from a small number of observations that have WSCs very different from their grade and well beyond their respective Zones of Tolerance.

For example, the upper bound for the EAS-20 grade is 13,000 WSCs and the upper Zone of Tolerance for the EAS-20 grade (between grade EAS-20 and grade EAS-21) is between 13,001 WSCs and 14,299 WSCs. But there is an EAS-20 observation with 19,726 recorded WSCs.[6] The model would classify this office as a grade EAS-21, even though it is an EAS-20 grade in the data. Similarly, the lower bound for the EAS-21 grade is 13,001 WSCs and the lower Zone of Tolerance is between 11,701 WSCs and 13,000 WSCs. Yet there are two EAS-21 post offices with WSC values well below the lower Zone of Tolerance at WSC values of 683 and 4,609. The model would appropriately classify these two offices as EAS-20 grades despite being EAS-21 grades in the data. When these actual observations differ from their expectations, such circumstances cause the H-L statistic to indicate that the model has a poor fit.

Potential influential observations can be identified by investigating the existence of post offices that are outside the Zone of Tolerance limits for their grade. To do this, a cutoff value is established for each Zone of Tolerance that is well beyond the extreme value for that Zone of Tolerance. For example, the extreme value for the EAS-20 upper Zone of Tolerance is 14,299 WSCs and the cutoff value is 18,000 WSCs. All of the cutoff values are presented in Table 12.

Table 12: Identifying Exreme Values

Model	**Type of ZOT**	**ZOT Limit**	**Cutoff**	**# Identified**
18B to 20	18B Upper	6,049	7,000	0
	20 Lower	4,951	4,500	8
20 to 21	20 Upper	14,299	18,000	1
	21 Lower	11,701	10,000	2
21 to 22	21 Upper	28,599	30,000	1
	22 Lower	23,401	20,000	4
22 to 24	22 Upper	75,020	80,000	0
	24 Lower	61,381	50,000	2

[6] Given that this observation has a WSC value so far from the other EAS-20 offices, it is unlikely to be accurate.

Post offices with WSC levels that are outside the cutoff values can be fairly designated as misclassified. Their WSC level is actually associated with a different EAS grade and the misalignment could be created by a data error. Fortunately, there are very few such offices. There were 9,434 post office observations used in the estimation of the four logit models between EAS-18B and EAS-24 and only 18 observations were found to be potentially disruptive. The impact of this small number of highly unusual observations can be determined by re-estimating the logit models on the remaining 99.8 percent of the data. Doing so has a remarkable impact on the goodness of fit measures as it shifts all of the H-L statistics from rejecting to not rejecting the null hypothesis of a good model fit.

Table 13 Hosmer–Lemeshow Statistics After Eliminating Outliers

Model	**H-L Statistic**	**Reject H_o?**
18B to 20	4.64	No
20 to 21	3.14	No
21 to 22	1.66	No
22 to 24	3.14	No

In addition, estimated coefficients for WSCs are all larger after omitting these few observations, indicating that they were exerting a downward bias on the estimated responses to WSC changes. Table 14 presents the logit model results after the extreme observations were removed.

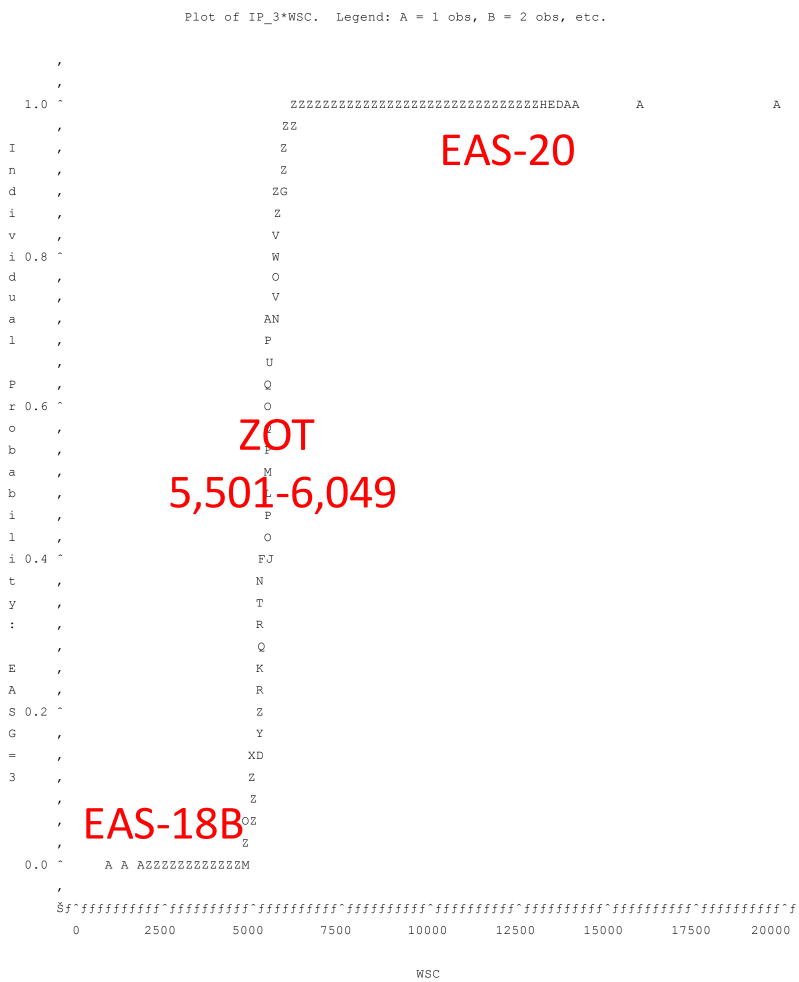
Table 14: Logit Estimation Results After Removing Extreme Observations

Model	Parameter	Estimate	Std. Error	Wald Chi-Square
18B to 20	Intercept	-41.0796	2.3043	317.828
	WSCs	0.00757	0.000425	317.7699
20 to 21	Intercept	-45.5707	3.7218	149.9219
	WSCs	0.00349	0.000287	148.1936
21 to 22	Intercept	-47.8038	5.0008	91.3802
	WSCs	0.00184	0.000193	91.0048
22 to 24	Intercept	-37.4893	5.4375	47.5348
	WSCs	0.000544	0.000079	47.6234

All estimated parameters remain statistically significant and the results demonstrate the same pattern of falling values for the estimated WSCs coefficient as the EAS grade increases. Given these results, the improved model fit, the small number of omitted observations, and the extreme nature of those omitted observations, these are the preferred results.

Another, non-statistical, way to evaluate the logit model is to see how well the predicted values reflect the step-function nature of EAS grades. The following graph shows the individual probability values for the post office observations used to measure the response in EAS-18B Postmasters to an increase in WSCs. The graph reveals that the logit model accurately captures the step-function pattern with EAS-18B offices at the bottom, EAS-20 offices at the top, and Zone of Tolerance offices in between. In the graph, a zero value indicates an EAS-18B office and a value of 1 indicates an EAS-20 office.

Figure 8: Predicted EAS Values from the EAS-18 to EAS-20 Logit Model



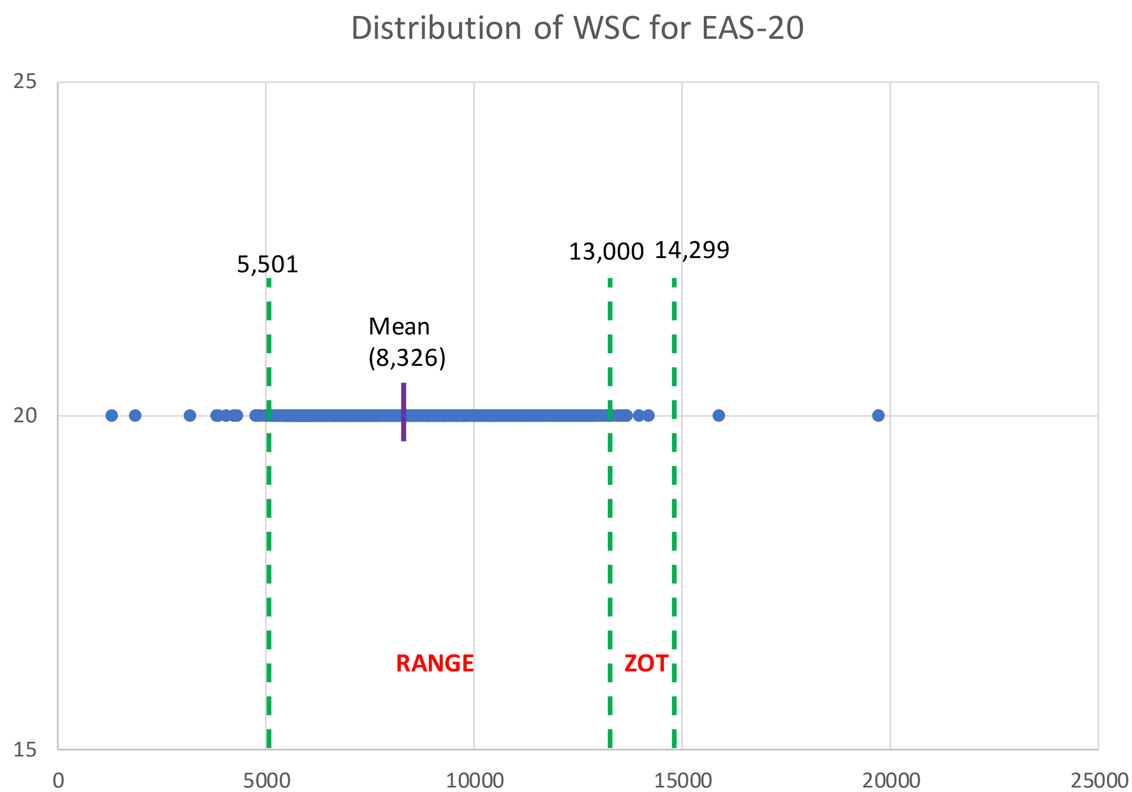
The estimated WSCs coefficients provide a measure of how the odds ratio changes as WSCs change. While this provides insight into the way changes in WSCs affect Postmaster EAS grades and, ultimately, costs, the coefficients themselves are difficult to interpret. A more direct way of understanding the meanings of the estimated coefficients is through calculating the marginal effects, which measure the impact of changes in WSCs on the probability of moving up an EAS grade. Marginal effects describe how responsive EAS grade changes are to WSC changes and are found by taking the derivative of the probability function (provided above) with respect to WSCs:

$$\frac{\partial \pi_i}{\partial\, WSC_i} = \frac{\partial\left(\frac{e^{\alpha+\beta\, WSC_i}}{(1+e^{\alpha+\beta\, WSC_i})}\right)}{\partial\, WSC_i} = \frac{\beta\, \pi_i}{1+e^{\alpha+\beta\, WSC_i}}.$$

Because WSCs appears in the denominator of the formula, the marginal effect is going to depend upon the level of WSCs at which it is calculated. For models with continuous dependent variables, the appropriate evaluation point is the mean of the cost driver or explanatory variable. But with a discrete dependent variable, that may no longer be the case. To understand why, consider the distribution of WSCs for the EAS-20 grade. The range of WSC values that define that grade start at 5,501 WSCs and end at 13,000 WSCs. The upper Zone to Tolerance starts at 13,001 WSCs and ends at 14,299 WSCs. The mean WSC value for the grade is 8,326 WSCs. The distribution of WSC values, along with the EAS-20 range and upper Zone of Tolerance, are presented in Figure 9.

For a post office to move from EAS-20 to EAS-21 it must be in the upper Zone of Tolerance, meaning it must have earned a sufficiently large increase in WSCs to put it in that range. Of course, this is much easier for a post office in the upper end of the WSC distribution than in the lower end of the distribution. Consider a post office with the mean value for WSCs of 8,326. For it to reach the Zone of Tolerance it must gain 4,676 WSCs, an increase of 56 percent. Given the nature of change in the factors that determine WSCs (e.g. office revenue, number of PO boxes) the chances of this occurring in one year are virtually zero. The marginal effect measures the increase in probability associated with a small increase in WSCs. At the mean WSCs for a grade, adding, 10, 100, or even 500 WSCs would have a negligible (but positive) effect on the probability as it would still remain essentially at zero. The resulting marginal effect (and resulting variability) is necessarily extremely close to zero. And that is the result obtained if the marginal effect is calculated at mean WSCs.[7]

Figure 9: WSC Values and Boundaries for Grade EAS-20



Now consider a post office at the upper boundary of the EAS-20 range with 13,000 WSCs. It has a much more substantial probability (45 percent) of moving up to

[7] For a post office at the mean value of WSCs for grade EAS-20, the probability of becoming an EAS-21 office is 0.00000007, with is extremely close to zero. The marginal effect is 2.35 E-10 which is also extremely close to zero.

EAS-21. For this post office, an increase of 10, 100, or 500 WSCs will have a material impact on its probability of moving up a grade. Accordingly, the marginal effect for this office is 0.00086, meaning an increase of 100 WSCs increases its probability of moving up to EAS-21 by 8.6 percentage points.

This example makes two key points. First, to get a realistic sense of the logit models' estimated marginal effects, those effects should be calculated at the boundary for the EAS grade. Second, to accurately calculate a variability, it is important to take into account the actual distribution of WSCs across the offices in a given grade. The result of an increase in WSCs will differ, for example, if offices are clustered toward the bottom of the WSC range as opposed to being clustered toward the top of the range.

The marginal effects are presented in Table 15. As expected, they decline as the EAS grade increases. This demonstrates the important point that the speed of transition differs across different EAS grades.

Table 15: Marginal Effects from the Logit Models

EAS Grades	Marginal Effect	Percentage Point Change Resulting from a 100 WSC Increase
18B to 20	0.00175	17.5%
20 to 21	0.00086	8.6%
21 to 22	0.00046	4.6%
22 to 24	0.00013	1.3%

B. Investigating an EAS-24 Model

The Docket No. R84-1 methodology assumed that the variability for offices in grades EAS 24 and above was zero, based on the assertion that salaries for

Postmasters at these offices were not dependent upon the level of revenue or volume. Given the PS 150 data set includes data for both EAS-24 and EAS-26 offices, this assumption can be tested by estimating a logit model for the transition between these two EAS grades. If the assumption is correct, the estimated coefficient on WSCs will be zero.

To test this assumption a logit model for the EAS-24 to EAS-26 transition was estimated. As Table 14 shows, the results indicate rejection of the assumption because the estimated coefficient on WSCs, although small, is positive and statistically significant.

Table 16: Estimation Results For an EAS-24 Logit Model

Model	**Parameter**	**Estimate**	**Std. Error**	**Wald Chi-Square**
24 to 26	Intercept	-63.37	21.23	8.91
	WSCs	0.000394	0.000132	8.88

Moreover, the EAS-24 to EAS-26 logit model fits well with an adjusted Cox-Snell R^2 statistic of 0.975 and an H-L statistic of just 0.049 signifying a failure to reject the null hypothesis of a good fit.[8] It thus can support the calculation of a variability for Postmasters in grade EAS-24, and EAS-24 Postmasters will be included in the variability calculation.

C. Estimating the EAS-18 to EAS-18B Model

The last model to be estimated is for the step between the new EAS-18 grade and the new EAS-18B grade. Estimating a model for the new EAS-18 grade is more

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[8] Because the H-L statistic indicated a good model fit when all observations were use, there was not need to identify and remove extreme observations.

challenging than for the other grades because the Postal Service has not yet established a Zone of Tolerance between EAS-18 and EAS-18B. Also, because this grade is brand new, the Form 150 data do not yet include any Postmasters who have made the transition between the two grades. However, there is an abundance of data on which to estimate the logit model, with 4,113 new EAS-18 observations in addition to the 4,535 EAS-18B observations. So, it is feasible to attempt the estimation.

Table 17 presents the results of estimating the logit model for the EAS-18 to EAS-18B transition. Both the intercept and the WSCs coefficient are statistically significant and the Cox-Snell Adjusted R^2 statistic is 0.942. In addition, the estimated WSCs coefficient is the larger than the estimated coefficients from any of the other logit models, indicating that a given increase in WSCs will have a relatively large impact on the movement of a post office from EAS-18 to EAS-18B. The H-L statistic, however, is large, indicating rejection of the null hypothesis of a good model fit.

Table 17: Estimation Results For an EAS-18 Logit Model

Model	**Parameter**	**Estimate**	**Std. Error**	**Wald Chi-Square**
18 to 18B	Intercept	-21.81	0.8223	703.7
	WSCs	0.0105	0.0004	707.3

Because the Postal Service has not yet established a Zone of Tolerance between grades EAS-18 and EAS-18B, the process to find extreme observations in the previous logit models cannot be directly applied to this one. However, a similar process can be followed. Before the lower grades were eliminated from the EAS system, the pre-POStPlan EAS-18 grade was preceded by the EAS-15 grade.[9] To investigate extreme observations, the Zones of Tolerance for those two grades can be applied to find the relevant cutoffs. The upper Zone of Tolerance for the old EAS-15 grade went from 2,076 WSCs to 2,291 WSCs. As before, to ensure only extreme values for WSCs are considered, a cutoff value of 2,400 WSCs was selected, as it is well beyond the upper value of the Zone of Tolerance. The lower Zone of Tolerance for the pre-POStPlan EAS-18 grade was 1,869 to 2,075. A cutoff value of 1,700 was selected to serve the same purpose for grade EAS-18B offices. These cutoffs identified nineteen extreme observations meaning 99.8 percent of observations were retained. Table 18 presents the logit model results after removing the extreme observations. As with the other logit models, removing the small number of extreme observations increases the size of the responsiveness coefficient and produces an H-L statistic of 0.0078, indicating support for a good model fit. This is the preferred grade EAS-18 logit model.

Table 18: Estimation Results For an EAS-18 Logit Model After Removing Extreme Observations

Model	Parameter	Estimate	Std. Error	Wald Chi-Square
18 to 18B	Intercept	-139.50	13.5525	106.0
	WSCs	0.0675	0.0066	106.2

[9] The range for the pre-POStPlan EAS-18 grade (when there were EAS grades below it) was between 2076 WSCs and 5500 WSCs. The range for the new EAS-18B grade is the same.

VIII. Calculating the Variabilities

The Postmaster variability to be calculated is the percentage response in Postmaster costs for a given percentage change in WSCs. This response depends upon two factors: how many Postmasters shift an EAS grade as a result of the WSC increase, and the salary increase associated with the shift to the new grades. As explained above, logit models are designed to measure the probability of a "success" (here, achieving a higher EAS grade). When a logit model produces a probability of 0.50 or higher, a success occurs. The estimated Postmaster logit models can predict the probability, for each post offices in the EAS system, of whether the next higher EAS grade will be reached after a WSC increase. For example, consider EAS-18B post offices. The logit model will classify them as either grade EAS-18B or grade EAS-20 according to the following rule:

$$\widetilde{y_\iota} = EAS\ 20\ if\ \frac{e^{\alpha+\beta\,WSC}}{1+e^{\alpha+\beta\,WSC}} \geq 0.50\ and\ \widetilde{y_\iota} = EAS\ 18B\ if\ \frac{e^{\alpha+\beta\,WSC}}{1+e^{\alpha+\beta\,WSC}} < 0.50$$

In this way, the estimated logit models can be used to compute how many offices change their EAS grade in response to a given percentage change in WSCs.

To complete the variability calculation, the change in salaries caused by the movement of Postmasters through EAS grades must be computed. The salary change is what will determine the cost impact of the Postmaster movements. If the salaries for two EAS grades are quite close, then there will be relatively little cost impact associated with a Postmaster moving up a grade, and the resulting variability will be relatively low. With little difference in salaries, even a large Postmaster movement will not cause much of an increase in cost. In contrast, a large gap between the salaries of two EAS grades will lead to a larger variability.

Formally combining the shift in the number of Postmasters with the change in salary produces the algorithm necessary for computing the Postmaster variability. The algorithm starts with the set of offices in a given EAS grade, like grade EAS-20. This number is used to calculate the baseline costs for these offices. Because a small number of offices have a WSC value in the upper part of the Zone of Tolerance, the logit model will classify them as being in the higher grade. To calculate the baseline costs requires multiplying the number of offices in each grade by the associated minimum salary.

The next step is to calculate how many offices move up an EAS grade because of higher WSCs. To make this calculation, the WSCs at each office is increased by a given percentage, which is capture by a θ parameter.[10] The estimated logit model for the EAS grades is then used to find the new grade for each office. If the percentage increase in WSCs is captured by θ, then the formula for the new classification of offices is given by:

$$Pr(y = 1|\ \theta\, WSC) = \frac{e^{\alpha+\beta\ \theta\, WSC}}{1 + e^{\alpha+\beta\, \theta\, WSC}}$$

The post-WSC-increase office classification is then used to calculate the new cost by multiplying each newly classified office by its associated minimum salary. The implied percentage change in cost is then calculated and divided by θ-1 to produce the

[10] To increase the amount of WSCs, θ is equal to one plus the percentage increase in WSCs. For example, a 10 percent increase in WSCs would imply a θ to equal 1.1.

elasticity. The variabilities caused by a 10 percent increase in WSCs, for each EAS grade, along with the associated percentage changes in Postmasters and salaries are presented in Table 19.

Table 19: Calculating the Variabilities by EAS Grade

Grades	Change in # of PM	% Change In # of PMs	Change in Min Salary	% Change in Min Salary	Variability of Cost
18 to 18B	379	9.3%	5,219	9.7%	8.9%
18B to 20	308	6.9%	6,000	10.1%	6.9%
20 to 21	194	7.5%	5,700	8.7%	6.5%
21 to 22	104	9.0%	2,300	3.2%	2.9%
22 to 24	44	5.2%	8,700	11.9%	6.1%
24 to 26	14	5.5%	17,900	21.8%	11.9%

The value for the variability comes from two sources, the percentage change in the number of Postmasters and the percentage increase in the minimum salary across the two EAS grades.[11] The larger either one of these factors, the larger will be the variability. For example, the grade EAS-21 variability is low because the percentage salary increment is small, as the increase from $71,000 to $73,300 is just a 3.2 percent increase. Similarly, the variability for grade EAS-24 Postmasters is high because there is a large salary increment between grades EAS-24 and EAS-26 Postmasters. The

[11] Because of the additive nature of the post-volume Postmaster costs (the remaining cost in the EAS-20 grade plus the new costs in the EAS-21 grade) the elasticity of cost is not the product of the percentage change in Postmasters times the percentage change in salary.

elasticity in the number of Postmasters depends upon how many Postmasters are close enough to or in the Zone of Tolerance, so they would move up as WSCs increase. There are relatively few Postmasters in the upper grades and they are not clustered near the Zone of Tolerance, so there is not much response in Postmaster movement to an increase in WSCs.

Because of the discrete nature of the cost change in the EAS system, the estimated variability depends upon the size of the change in WSCs used to calculate the variability. To investigate the implications of this characteristic of the calculation of the variability, the EAS-grade variabilities for a wide range of different-sized WSC changes were calculated. To acquire a sense of a reasonable range of WSC changes to employ, one can compare how actual WSCs and Postmasters varied between 2018 and 2019.

To investigate growth in WSCs and Postmasters over that year, the Form 150 data from April 2019 data are compared with the Form 150 data from April 2018, by EAS grade. Because the split between the new EAS-18 and EAS-18B is new in 2019, the two new categories must be combined to match the old EAS-18 grade from 2018. Table 20 shows that there was a net increase in 5 Postmasters over the year, reflecting the stability in the Postmaster cohort.

Table 20: Numbers of Postmasters By Grade
in 2019 and 2018

Grade	19-Apr	18-Apr	Difference
EAS-18	8,648	8,649	1
EAS-20	2,614	2,619	-2
EAS-21	1,170	1,169	0
EAS-22	858	852	4
EAS-24	257	253	4
EAS-26	64	64	0

The year-over-year data can also be used to calculate the annual growth in WSCs. Between April 2018 and April 2019, the system-wide WSCs grew by just over one-half of one percent.

Table 21: Year Over Year Growth in WSCs

April 2019 WSCs	April 2018 WSCs	Growth
138,067,978	137,228,138	0.61%

The change in total WSCs indicates modest overall growth in Postmaster activity, but the overall value could mask the movement of WSCs across grades. If certain Postmasters are moving from one EAS grade to another, individual EAS grades may see larger changes in WSCs even though the overall total is relatively stable. Table 22 presents the year-over-year percentage changes in WSCs for the individual grades.

Table 22: Year over Year WSC
Growth by EAS Grade

Grade	Annual Growth
EAS-18	0.39%
EAS-20	-0.18%
EAS-21	-0.16%
EAS-22	0.63%
EAS-24	2.09%
EAS-26	0.61%

The relatively large percentage growth in EAS-24 WSCs arises because there are so few Postmasters in the grade (253 in 2018). Even without a change in the average WSCs per Postmaster, the addition of 4 Postmasters in that grade increased the grade's WSCs by 1.6 percent. The rest of the WSC increase is due to higher WSCs per Postmaster. These numbers suggest that, at least for 2018 and 2019, there is relatively little growth in WSCs on a year-over-year basis. However, to account for the possibility that the variability could be applicable to a variety of circumstances, a sensitivity test was performed for a wide range of possible WSC changes. The WSC growth range started at 2.5 percent and was increased by 2.5 percentage point increments to the maximum value of 20 percent.

The results of the sensitivity analysis are presented in Table 23. With one exception, the calculated variabilities are stable. As expected, they increase modestly as the change in WSCs increases. This is because a larger increase in WSCs will cause more post offices to move to a higher EAS grade. As long as the growth in the number of offices shifting due to a bigger WSC change is proportionally greater than the increase in WSCs, the variability will increase. However, except for grade EAS-24, the increases are modest, suggesting that the calculated variabilities are not particularly sensitive to the WSC growth level chosen for the calculation.

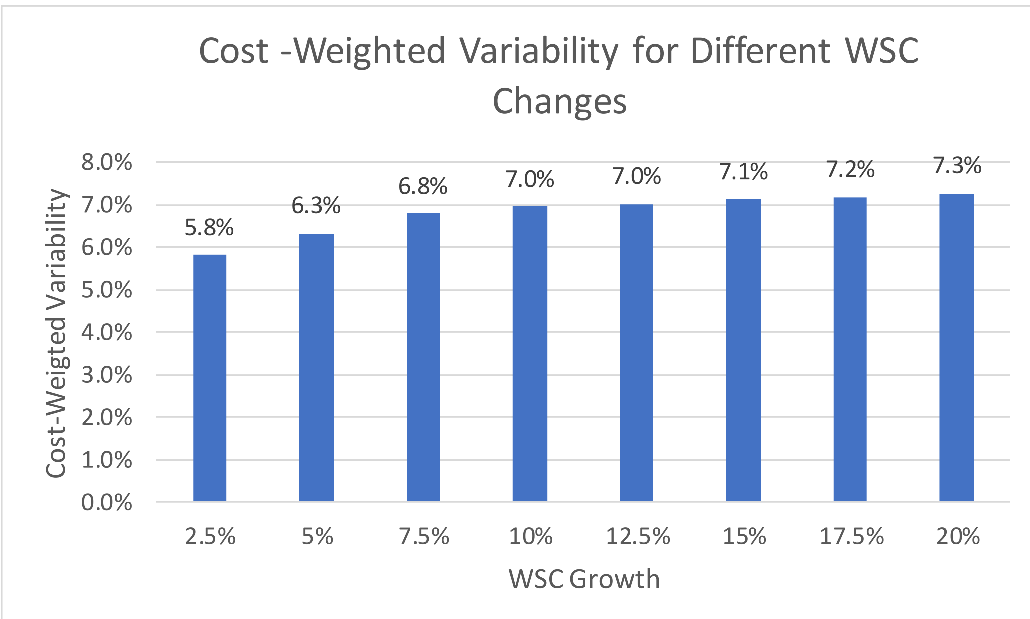
Grade EAS-24 experiences a relatively sharp increase in the calculated variability as the WSC growth goes from 2.5 percent to 7.5 percent. After that, the calculated variabilities are relatively stable. But this result is understandable because grade EAS-24 has only 257 post offices in the grade. That being the case, small increases in WSCs are unlikely to cause many offices to shift up to the EAS-26 grade. In fact, the 2.5 percent WSC increase causes only 1 office to move and the 5 percent WSC increase causes only 4 offices to move.

Table 23: Impact of Different WSC Changes on the Calculated Variability

	Percentage Change in WSCs							
Grade	**2.5%**	**5%**	**7.5%**	**10%**	**12.5%**	**15%**	**17.5%**	**20%**
18	8.1%	9.0%	9.0%	8.9%	8.9%	9.1%	9.0%	9.0%
18B	5.6%	5.5%	6.4%	6.9%	7.0%	6.9%	7.1%	7.4%
20	5.7%	6.6%	6.7%	6.5%	6.6%	6.7%	6.7%	6.9%
21	2.2%	2.6%	3.0%	2.9%	3.2%	3.3%	3.3%	3.3%
22	5.0%	5.3%	4.6%	6.1%	6.1%	6.0%	6.2%	6.2%
24	3.4%	6.8%	12.4%	11.9%	11.5%	13.0%	13.6%	13.1%

One way to make an overall assessment of the potential impact of different WSC growth rates is to calculate a cost-weighted variability across all seven EAS grades. (The variability for EAS-26 post offices continues to be zero by assumption. EAS-26 offices account for less than one percent of Postmaster salary costs.) The cost-weighed variabilities for the different WSC growth rates are presented in Figure 10, which shows that the cost-weighted variability is slightly lower for the two smallest WSC categories but then stabilized in the range of a 7 percent variability. The results of the sensitivity analysis support the use of a 10 percent WSC change as the benchmark for calculating Postmaster variabilities.

Figure 10: The Impact of Different WSC Changes on the Cost-Weighted Variability



IX. Impact Analysis

With different variabilities for each of the EAS grades, there is no longer a single variability that is applied to accrued Postmaster costs. To find total volume variable costs under the new approach, the FY 2018 accrued cost for each grade is multiplied by the variability estimated for that grade. Those multiplications produce the volume variable costs for each grade and then the grade-level volume variable costs are summed to get total volume variable cost. But in FY 2018, the new EAS-18 and EAS-18B grades did not yet exist. Consequently, for that year there are not separate accrued costs pools to which the variabilities can be applied. Thus, for this historical analysis, one must calculate an overall variability for the old EAS-18 grade. This is done by finding the cost-weighted average variability based upon the new EAS-18 and EAS-18B variabilities.[12]

The combined grade EAS-18 variability is calculated using the relative Postmaster accrued costs from the April 2019 Form 150 data as weights. The cost-weighted variability for the combined EAS-19 grade is 0.078 = 0.0893*0.04526 + 0.0686*0.05474. With this calculation, the overall volume variable costs can be calculated using the EAS grade accrued costs from CS01-NP-FY18.xlsx.

Table 24: Calculating Volume Variable Costs Under the New Methodology

ITEM	POSTMASTER SALARIES DISTRIBUTION KEY	ACCRUED COSTS DISTRIBUTED TO COMPONENTS	CAG L ACCRUED COSTS	TOTAL ACCRUED COSTS	VARIABILITY FACTOR	VOLUME VARIABLE COSTS	OTHER COSTS
UNITS	$	$(000)	$(000)	$(000)	%	$(000)	$(000)
EAS 18	620,175,071	964,862	22,076	986,938	7.80%	76,941	909,997
EAS 20	208,130,611	323,807		323,807	6.48%	20,971	302,836
EAS 21	96,758,072	150,535		150,535	2.88%	4,336	146,199
EAS 22	73,487,104	114,330		114,330	6.08%	6,952	107,378
EAS 24	24,480,207	38,086		38,086	11.87%	4,521	33,565
1.2 POSTMASTERS EAS-26 AND ABOVE	12,914,659	20,092		20,092	0.00%	-	20,092
TOTAL	1,035,945,724	1,611,714	22,076	1,633,790		113,722	1,520,068

[12] This issue will disappear going forward as the new EAS grades are used.

This produces an overall variability of seven percent, which is below the Docket No. R84-1 variability. The lower variability occurs because of three reasons. First, the Docket No. R84-1 variability was overstated due to a computational error. Correcting that error reduces the Docket No. R84-1 variability to 13 percent. Second, as explained above, POStPlan eliminated the lower EAS grades. In the lower grades, Postmasters could move relatively rapidly to a higher minimum salary by moving up an EAS grade. As a post office gets to the higher EAS grades, much larger increases in WSCs are required to move to a higher grade. Thus, increases in WSCs for Postmasters in the higher grades of the EAS system are less likely to cause them to move up to a higher minimum salary. This means that a given percentage increase in volume is less likely to create an increase in cost -- creating a lower variability.

Third, the Docket No. R84-1 approach measures only the <u>potential</u> increase in cost from increases in volume and thus WSCs, not the actual increase. That is, it measures how quickly salaries would rise from an overall increase in WSCs. But each EAS grade has a wide band of WSCs associated with it and most post offices have a level of WSCs such that typical increases will keep the Postmaster in the same grade.

The Docket No. R84-1 methodology did not account for the amount of WSCs Postmasters are actually earning (captured by the distribution of offices, by WSCs within each grade), nor did it attempt to measure how quickly the existing complement of Postmasters would move up a grade if WSCs increased. The new study does those measurements and captures the impact of WSC increases that keep Postmasters in their same EAS grades as well as those that cause an increase in EAS grade.

The Form 150 data show that the number and distribution of Postmasters across grades is quite stable, suggesting that the actual response in Postmasters to WSC changes is lower than the potential response measured in the Docket No. R84-1 methodology.

Reducing the variability causes a reduction in total Postmaster volume variable costs. This translates into proportional reductions in Postmaster volume variable costs per piece by product. However, Postmaster costs per piece are typically quite small to begin with, particularly for market-dominant products. See Table 25 below. Consequently, the overall impacts on volume variable costs per piece are generally quite small.

The Postmaster volume variable cost per piece for First Class Mail is just $0.0025 in the established methodology. It falls to $0.0010 under the new Postmaster study. This is a substantial proportional decline, but the absolute reduction in First Class marginal cost is just $0.0015. Given that the overall marginal cost for First Class Mail was $0.209 in FY 2018, this Postmaster cost change is not material. The only market-dominant product to see a per-piece decline as large as one cent is Media/Library Mail, whose volume variable Postmaster cost per piece falls from about two cents to just eight-tenths of a cent. Of course, this decline is still quite small relative Media/Library Mail's overall volume variable cost per peice of $4.55, only about one-quarter of one percent.

Because Postmaster costs are somewhat higher for a few competitive products, the absolute decline in unit costs is a bit more noticeable. Again, however, expressing the declines associated with the new Postmaster methodology in terms of a percentage of overall costs per piece, none of the changes for any product reach one percent. Priority Mail Express overall unit costs fall by 0.8 percent, Retail Ground costs fall by 0.4 percent, and Priority Mail costs fall by half a percent. These are all modest declines in overall volume variable costs per piece. A table providing details on the impact of the proposal on all individual competitive products will be provided under seal.

Table 25: Impact on Market Dominant Products

Domestic Market Dominant Products	Proposed Methodology	Established Methodology	Difference
Single-Piece Letters	$0.0011	$0.0028	-$0.0017
Single-Piece Cards	$0.0008	$0.0020	-$0.0012
Presort Letters	$0.0009	$0.0022	-$0.0013
Presort Cards	$0.0006	$0.0015	-$0.0009
Single-Piece Flats	$0.0037	$0.0093	-$0.0056
Presort Flats	$0.0022	$0.0056	-$0.0034
Total First-Class Mail	$0.0010	$0.0025	-$0.0015
High Density and Saturation Letters	$0.0004	$0.0009	-$0.0005
High Density and Saturation Flats/Parcels	$0.0004	$0.0010	-$0.0006
Every Door Direct Mail-Retail	$0.0004	$0.0010	-$0.0006
Carrier Route	$0.0006	$0.0015	-$0.0009
Letters	$0.0005	$0.0012	-$0.0007
Flats	$0.0009	$0.0023	-$0.0014
Parcels	$0.0027	$0.0069	-$0.0042
Total USPS Marketing Mail	$0.0005	$0.0012	-$0.0007
In County	$0.0002	$0.0006	-$0.0004
Outside County	$0.0006	$0.0015	-$0.0009
Total Periodicals	$0.0006	$0.0014	-$0.0009
Bound Printed Matter Flats	$0.0017	$0.0042	-$0.0025
Bound Printed Matter Parcels	$0.0024	$0.0061	-$0.0037
Media/Library Mail	$0.0078	$0.0197	-$0.0119
Total Package Services	$0.0000	$0.0000	$0.0000
US Postal Service	$0.0000	$0.0000	$0.0000
Free Mail	$0.0000	$0.0000	$0.0000
Total Domestic Market Dominant Mail	$0.0007	$0.0018	-$0.0011

Table 26: Impact on Competitive and International Products

Domestic Competitive Products	Proposed Methodology	Established Methodology	Difference
Total Domestic Competitive Mail and Services	$0.0084	$0.0213	-$0.0129
Total International Mail and Services	$0.0062	$0.0158	-$0.0095